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“पुराने को छोड़ नये के तरफ”

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IS 9175-31 (1987): Rationalized Steels for Automobile and Ancillary Industry, Mechanical and Physical Properties - Part 31 20Ni7Mo2 Grade steel [MTD 16: Alloy Steels and Forgings]



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Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

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Indian Standard

**SPECIFICATION FOR
RATIONALIZED STEELS FOR
THE AUTOMOBILE AND
ANCILLARY INDUSTRY**

**PART 31 MECHANICAL AND PHYSICAL PROPERTIES OF
20Ni7Mo2 GRADE STEEL**

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Indian Standard

SPECIFICATION FOR RATIONALIZED STEELS FOR THE AUTOMOBILE AND ANCILLARY INDUSTRY

PART 31 MECHANICAL AND PHYSICAL PROPERTIES OF 20Ni7Mo2 GRADE STEEL

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Indian Standard

**SPECIFICATION FOR
RATIONALIZED STEELS FOR
THE AUTOMOBILE AND
ANCILLARY INDUSTRY**

**PART 31 MECHANICAL AND PHYSICAL PROPERTIES OF
20Ni7Mo2 GRADE STEEL**

0. F O R E W O R D

0.1 This Indian Standard (Part 31) was adopted by the Indian Standards Institution on 13 March 1987, after the draft finalized by the Co-ordinating Committee on Materials for Automobiles had been approved by the Structural and Metals Division Council.

0.2 Part 1 of this standard, published in 1979, covers the chemical composition of 33 rationalized steels. The mechanical properties, hardenability and isothermal transformation characteristics of these 33 rationalised steels are being covered in different parts (Parts 2 to 34) of this standard. The data concerning to these properties given in this standard is only for guidance and information purposes.

0.3 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard (Part 31) covers the chemical composition, mechanical properties, hardenability and isothermal transformation characteristics of 20Ni7Mo2 grade of steel for use by automobile and ancillary industry.

*Rules for rounding off numerical values (revised).

2. CHEMICAL COMPOSITION

2.1 The chemical composition of this grade of steel shall be as given below:

<i>Constituent, Percent</i>							
C	Si	Mn	Ni	Mo	S	P	
0.17-0.22	0.15-0.35	0.40-0.65	1.6-2.00	0.20-0.30	0.035	Max	0.035 Max

3. HARDNESS

3.1 The maximum hardness for this grade of steel delivered in the annealed condition when determined in accordance with IS : 1500-1983* shall be 207 HB.

4. MECHANICAL PROPERTIES

4.1 The mechanical properties of this grade of steel in the blank carburized and hardened condition, when determined in accordance with IS : 1598-1977† and IS : 1608-1972‡, shall be as given below:

- | | |
|---|-----|
| a) Tensile strength, MPa, <i>Min</i> | 850 |
| b) Elongation, percent, <i>Min</i>
(gauge length $5.65\sqrt{S_0}$) | 11 |
| c) Izod impact value, joules, <i>Min</i>
and room temperature | 28 |
| d) Limiting ruling section, mm | 30 |

5. HOT WORKING AND HEAT TREATMENT TEMPERATURES

5.1 The recommended hot working and heat treatment temperature shall be as given below:

Forging/rolling	1 250°C
Process annealing temperature	650°C
Carburizing temperature	880-920°C
Refining temperature	850-880°C
Hardening temperature	760-780°C
Tempering temperature	200°C Max

*Method for Brinell hardness test for steel (first revision).

†Method for izod impact test of metals (first revision).

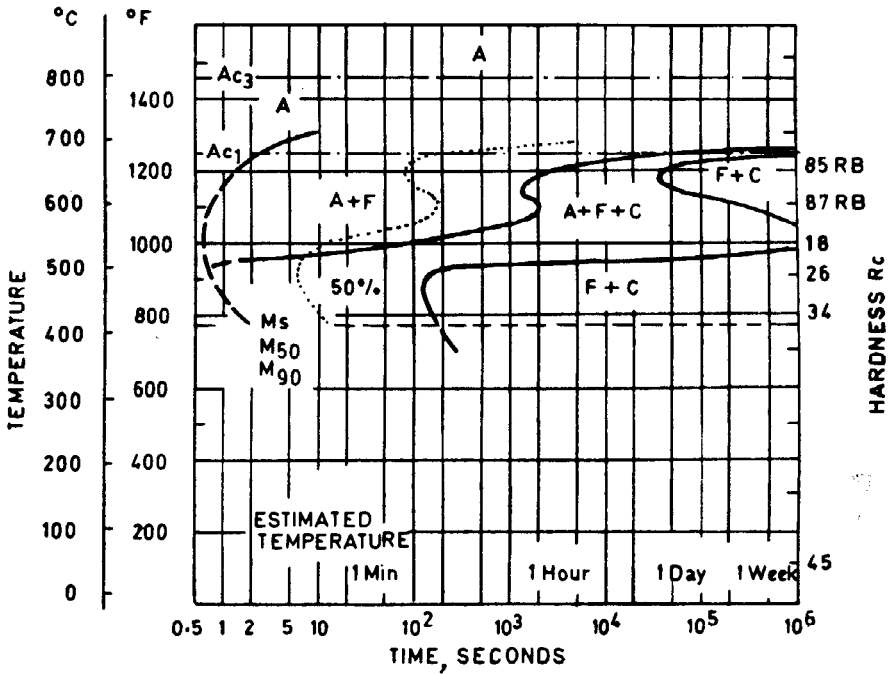
‡Method for tensile testing of steel products (first revision).

6. TRANSFORMATION CHARACTERISTICS

6.1 The isothermal transformation diagram for this grade of steel is given in Fig. 1.

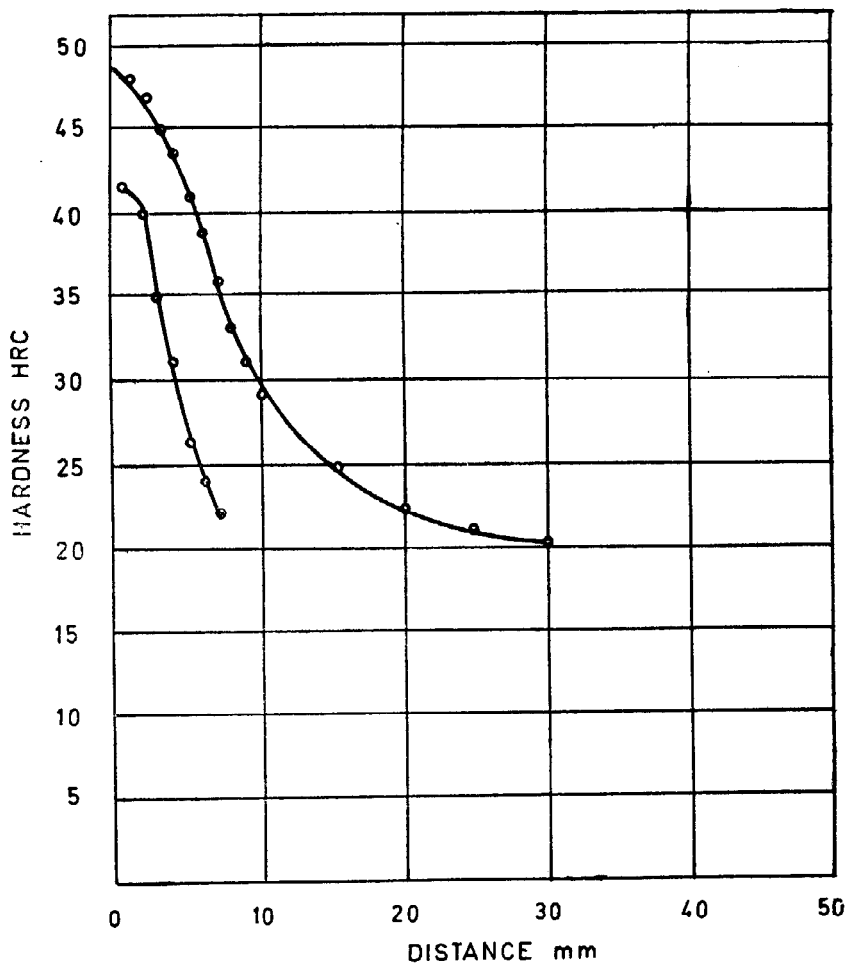
7. HARDENABILITY

7.1 The end quench hardenability curve is given in Fig. 2.



Austenitized at 827°C
 Grain Size 8
 Starting Criterion 0.1% Transformation
 A — Austenite
 F — Ferrite
 C — Carbide
 M — Martensite

FIG. 1 ISOTHERMAL TRANSFORMATION DIAGRAM OF 20Ni7Mo2 GRADE STEEL



	Normalize 927°C						Austenitize 927°C							
Distance mm	1	2	3	4	5	6	7	8	9	10	15	20	25	30
HRC, <i>Max</i>	48	47	45	44	41	39	36	33	31	29	25	22	21	20
HRC, <i>Min</i>	41	40	35	31	26	24	22	—	—	—	—	—	—	—

FIG. 2 END QUENCH HARDENABILITY BAND OF 20Ni7Mo2 GRADE STEEL

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Panel to Collect Data on Steel for Automobile Purposes, SMDC 31 : P 12

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INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

QUANTITY	UNIT	SYMBOL
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

QUANTITY	UNIT	SYMBOL
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

QUANTITY	UNIT	SYMBOL	DEFINITION
Force	newton	N	1 N = 1 kg.m/s ²
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m ²
Frequency	hertz	Hz	1 Hz = 1 c/s (s ⁻¹)
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pasca ¹	Pa	1 Pa = 1 N/m ²